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REVIEW ARTICLE

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Co-production of accessible digital mental health supports with marginalised young people: a scoping review

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ABSTRACT

Background and aims: While some digital supports aid in improving young people's mental health, there is a dearth of information regarding the most effective ways to involve young people in the co-production of digital technologies. User input is essential, particularly for marginalised young people who are often excluded. The aim of this scoping review was to examine recent literature on the most common co-production processes of digital mental health supports with marginalised young people.

Method: A scoping review was conducted to identify literature published since 2021, written in English, focusing on co-production processes of digital mental health supports with marginalised young people aged 16–25. Basic information, data relating to the research question and key findings were extracted. A combination of Excel and Covidence management software was used to collate the charted data and manage the screening process. Studies were included if they used innovative youth-led approaches in the design, development, implementation or evaluation of digital mental health supports ranging from mental health promotion to targeted interventions.

Results: Out of 2341 studies initially screened, 21 studies published between 2021 and 2023 with a range of study designs and evidence were included. The studies reported on engagement with marginalised young people in the design, implementation, and/or evaluation of digital mental health technologies. The review examined qualitative and mixed methods studies from eleven countries, with most co-produced digital supports relating to mental health promotion and prevention. Most common were supports targeting general mental health and mental wellbeing. More than half of the studies included representation from LGBTQ+ young people, followed by ethnic minorities and migrants, but few included other marginalised groups. Only 6 of 21 studies used innovative approaches and many typically involved young people in only one of the co-production processes with design identified as most common. Finally, passive rather than active participation of young people was found to be pronounced. This limits young people's opportunities to shape the outcome to the data collection process only.

Conclusion: Given the extent to which marginalised groups are actually involved in co-production, the review suggests the need for young people to be more actively involved in all co-production processes of digital mental health technologies. Offering a diverse range of methods through innovative, participatory approaches can facilitate more effective engagement from young people and provide an environment that is inclusive to a range of voices and perspectives. Lastly, the lack of inclusion of marginalised groups such as young people with a disability, or youth living in rural areas is an important issue to consider for future research.

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Introduction

Background

Mental health is a global challenge, and it is important to ensure that young people have the necessary skills and supports needed to thrive in an increasingly complex, technology-driven, and competitive world. While there are feasible evidence-based approaches available to support young people's mental health, their implementation in practice is fragmented (Barry et al., 2019; Kuosmanen et al., 2019). Research suggests that some digital mental health supports can enhance access to mental health services and support for young people, including marginalised young people with mental health needs who would otherwise find it difficult to seek help (Piers et al., 2023). Existing research suggests that digital mental health supports for youth are marked by low reach and poor uptake (Stiles-Shields et al., 2023). Research with young people who utilize digital mental health interventions has shown poor adherence and high dropout rates (Achilles et al., 2020; Liverpool et al., 2020). However, there are also contradictory findings, showing high levels of acceptability and usage, when compared to

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face-to-face mental healthcare for marginalised young people (Lehtimaki et al., 2021; Prior et al., 2023).

Marginalisation

There is no universal agreement on the definition of young people, but according to the World Health Organisation ([WHO], 2024), adolescent and young adults fall in the age range of 10-24. Young people categorised as "marginalised" in the digital mental health support context are the focus of this scoping review.

According to a briefing paper published by UNICEF's Office of Research (Auerswald et al., 2017, p. 1), "disadvantaged, vulnerable and/or marginalised adolescents are individuals aged 10–19, who are excluded from social, economic and/or educational opportunities enjoyed by other adolescents in their community due to numerous factors beyond their control". These factors include those operating at the individual (e.g. disability and ethnicity), family (including neglect and abuse) and social level (such as economic inequality, violence, stigma, racism, and migration). Those classified as disadvantaged, vulnerable and/or marginalised young people include immigrants, refugees, orphans, and members of stigmatised Indigenous, ethnic, or religious groups. They also comprise young people who belong to sexual minorities (e.g. gay, lesbian, bisexual and queer) or gender minorities (e.g. transgender and gender diverse). Young people who are marginalised can experience high levels of stress (Murthy, 2022). Exposure to high levels of individual, familial, and/or social stress in addition to adversity may have a lasting impact on the mental health and overall well-being of marginalised young people (Backes & Bonnie, 2019).

Previous analyses of co-production in digital mental health interventions have highlighted an underrepresentation of young people with learning disabilities and specific challenges (Bevan Jones et al., 2020), including those related to neurodiversity (Cullingham et al., 2023). Additionally, there is a notable absence of young people who belong to marginalised groups, such as the homeless, migrants, asylum seekers, refugees, and those from socioeconomically disadvantaged backgrounds (Eickers & Rath, 2021).

Also highly relevant is "digital marginalisation" or "digital exclusion" in the context of digital mental health technologies. The concept generally refers to people who do not have or use the internet, who cannot afford to pay for data access, who lack access to a fast and reliable internet connection (e.g. those who live in rural areas), and who do not have the skill set or access to learning the necessary skills for internet use (Eickers & Rath, 2021). Accessing online services is difficult for many disadvantaged groups, which can exacerbate the "digital divide," a technology-driven kind of social inequality that can increase people's marginalisation in other spheres of their existence (Sin et al., 2021). In this review, the concept of digital marginalization is primarily explored through marginalised young people's experience of it.

A primary reason for the lack of digital mental health support utilization among young people, especially those who are marginalised, is that many of these tools were not produced for and with them. Since young people are generally skilled at judging authenticity, promoting digital mental health supports for them without carefully considering their input during the various production processes and ensuring youth relevance could easily be regarded as incorrect (Stiles-Shields et al., 2023). Guidelines for digital mental health interventions emphasize the need for early user input during technology development, implementation, and evaluation to guarantee engagement, feasibility, and potential effectiveness (Liverpool et al., 2020).

Co-production

There is a lack of consensus in the literature on the definition of co-production (e.g. Filipe et al., 2017), which appears to depend on the narrative, culture, or discipline within which it is used. However, co-production has been identified by Palumbo (2016) as a complex, multifaceted process that, in its most basic form, relies on the input of service users (Ostrom & Ostrom, 1977), thus placing service user input as the foundation of the concept (Norton, 2019). While the terms "co-production" and "co-design" are often used interchangeably (Masterson et al., 2022; Wirral Council, 2024), co-design should not be viewed as stand-alone but rather a distinct component of co-production (Robert et al., 2022). For the purpose of this paper, co-production can be defined as the active involvement of citizens in service planning, design and delivery including the direct involvement of users in the production of their own services (Wallace, 2013). Emphasising equal partnership and power-sharing, co-production recognises that individuals with "lived experience" are in the best position to advise on what services and supports will improve their lives. When executed well, co-production aids in grounding conversations and upholding a person-centred perspective (Wirral Council, 2024). Co-production includes all phases of work from co-planning, co-designing, co-delivering through to co-evaluating (Roper, 2024) and requires acting in accordance with the principles of equality, diversity, accessibility, and reciprocity to put co-production into practice (Social Care Institute for Excellence [SCIE], 2022)

According to recent WHO reports (2023a, 2023b), active engagement of young people and other key stakeholders is central to producing effective mental health content, taking into account cultural context, language, accessibility, and gender sensitivity. Through consideration of these diverse factors, the active engagement of stakeholders allows co-production to be inclusive, comprehensive, and tailored effectively to the varied needs of young people. A rights-based framework for youth participation (based on the Lundy model, (2007)), has been co-produced with young people to ensure that the active participation is consistent, meaningful and, most importantly, underpinned by what young people want and need to feel safe and empowered to engage. However, there is a paucity of guidance on the most appropriate co-production processes for engaging young people in the different stages of appraising digital mental health technologies, especially with regard to those who are disadvantaged, vulnerable and/or marginalised (Bear et al., 2022;

Bevan Jones et al., 2020; Maxwell & Corliss, 2020). Given the identified gaps in literature highlighted above, the need for a review was identified.

With a primary interest in exploring innovative, meaningful youth-led approaches to digital mental health, this review examined co-production in the design, development, implementation, and evaluation phases of digital mental health supports for marginalised young people, as well as overall evaluations of co-production processes in this context.

Present review

The prevalence of mental health issues among young people across the island of Ireland is higher than ever before (Bond & O'Neill, 2023; Dooley et al., 2019; Hyland et al., 2022; Lynch et al., 2023; McNicholas et al., 2021). In spite of a sharp rise in demand for mental health services over the past five years, Ireland's youth mental health system remains overburdened, underfunded, and unable to provide prompt, effective mental health care (Finnerty, 2023; Mental Health in Northern Ireland, 2023). Consultations conducted with young people on their mental health in 2020 offer compelling justification for developing accessible supports and services that promote youth mental health in partnership with young people, especially for disadvantaged youth. In particular, there is a demand for evidence-based digital mental health supports.[1]

The review is part of a larger project called "Atlantic Futures,"[2] which in part examines accessible digital supports and blended services to promote the mental health of youth in Ireland and Northern Ireland. Involving young people and the organisations that support them is essential for determining the focus of the overall research project, as well as the best methods to investigate the advantages and disadvantages of using digital technologies for youth mental health. Engagement with young people (aged 16–25), including those who are marginalised, and the staff in health, youth and community services who support them will assist to: (1) identify the digital mental health challenges that young people in Ireland face; (2) identify appropriate digital mental health apps and interventions; (3) validate, in collaboration with young people, which digital mental health interventions are effective; and (4) use findings to inform policy and practice that service providers throughout Ireland will adopt.

In order to investigate co-production and marginalisation, which considers the specific needs of young people who are disadvantaged, vulnerable and/or marginalised from a socioeconomic, cultural and digital perspective, this scoping review has included, but was not limited to, the following groups of young people who, in the Irish context, have been identified as marginalised:

- Living in isolated rural areas[3]
- Socioeconomically deprived
- Unemployed
- Not in education, employment, or training
- Immigrants
- Asylum seekers
- Refugees
- Travelling community
- Lesbian, gay, bisexual, transgender, and queer (LGBTQ+) community
- Living with a disability (including those with a mental health diagnosis)
- Homeless

Focusing particularly on those who are marginalised, this scoping review explored the most common co-production processes for engaging young people in the different stages of designing, developing, implementing, and evaluating digital mental health technologies. Given the exploratory nature of this research question, a scoping review approach was chosen to examine the breadth and depth of the extant literature on co-production processes with marginalised young people in the context of digital mental health supports, which range from mental health promotion and primary prevention to targeted interventions. The review includes all types of digital interventions, such as websites and apps but excludes studies that report on digital delivery of services that are typically administered face-to-face such as remote counselling. Mapping and summarising the evidence, the review informs the overall research project as well as identifies and addresses knowledge gaps.

While it is the case that digital interventions and co-design were used prior to 2020, previous publications in this area have already reported on literature pre-pandemic. Many additional digital interventions have been developed since the pandemic, and many services have shifted towards digital offerings (e.g. Torous et al., 2020; Whelan et al., 2020). Thus, this review seeks to provide an up-to-date overview of the digital landscape that builds on previous work and should better inform future studies in this area.

Methods

The reporting of this current scoping review is based on the Preferred Reporting Items for Systematic Reviews (PRISMA) and Meta-Analysis Protocols Extension for Scoping Reviews guidelines (Tricco et al., 2018; see Supplementary File 1) and the review process was guided by Arksey and O'Malley's (Arksey & O'Malley, 2005) guidelines as well as subsequent modifications proposed by Levac and colleagues' (2010), which include the following 5 steps: (1) identifying research question; (2) identifying relevant studies; (3) study selection and data extraction, with methods refined using an iterative process throughout; (4) data charting; (5) collating,

[1]How's Your Head' report, Department of Children & Youth Affairs, 2020 and the "Youth Talk We Listen" online event, hosted by Jigsaw and the HSE Health and Wellbeing, June 2020); and the National Youth Council of Ireland's Youth Voice programme

[2]Atlantic Futures Project, Available: https://www.atlanticfutures.com/.

[3]Pobal maps. (n.d.). Available: https://maps.pobal.ie/WebApps/DeprivationIndices/index.html

summarising and reporting results. A protocol for this review was previously registered with the Open Science Framework (https://osf.io/9xhgv) and published in a peer-reviewed journal (Kealy et al., 2024).

Identification of research question

The main research question guiding this scoping review was: Which co-production processes and associated methods are most common for involving young people, especially those who are marginalised, in the development and delivery of digital mental health technologies?

Identifying relevant studies

After a preliminary search to ascertain the volume returned, the electronic databases listed hereafter were systematically searched for international literature published in English: PubMed, Scopus, EBSCO (CINAHL/PsycINFO/PsycArticles), Applied Social Sciences Index & Abstracts, Web of Science, Ovid MEDLINE, Cochrane database, Embase, Google Scholar, ProQuest Dissertations & Theses A&I, OAIster (Catalog of open access resources) and Bielefeld Academic Search Engine (BASE). The "search strategy," including the search terms as well as a database example of "search results," can be found in Supplementary File 2. The area of inquiry of this scoping review was guided by prior publications on co-production and/or disadvantaged young people in digital mental health interventions (Bear et al., 2022; Bevan Jones et al., 2020; Liverpool et al., 2020; Maxwell & Corliss, 2020; Piers et al., 2023). These studies have been conducted and/or published since the global coronavirus pandemic and associated restrictions in March 2020. Highlighting an under-representation of marginalised young people, searches followed on from these reviews and were limited to studies published from January 2021 to 24 October 2023. This guarantees that the review represents the most recent literature on the application of co-production approaches, as well as the dynamic nature of this study area. Published work from 2021 onwards has been included here to better reflect the present state of literature, considering the rapid adoption and assessment of digital mental health technology throughout the sector during the pandemic (Li, 2023).

Inclusion and exclusion criteria

Empirical research and discussions in the literature were included in the review if they: (1) were published since January 2021; (2) were published in English; (3) focused on co-production processes of digital youth mental health supports with marginalised young people aged 16–25 and (4) used innovative youth-led methodologies ((i.e. non-traditional methods such as interviews, survey focus groups etc.) to design, develop, implement and/or evaluate digital mental health supports for young people. While the WHO. (2024) definition of adolescent and young adults refers to the age range of 10–24, 16–25 years was selected for this review to capture the out-of-mandatory school population of young people in Northern Ireland and the Republic of Ireland as per education policies. Focusing on marginalised young people, the authors seek to identify the potential of digital solutions to reach young people who are not in education or employment.

Articles were excluded if they were: (1) non-digital interventions; (2) technologies produced primarily for physical health or diagnostic, screening, monitoring, communication or data management tools; (3) focused on digital mental health supports without young people's input in the development, implementation and/or evaluation of these supports and (4) involved children (under the age of 16) and adults (over the age of 25).

Study selection

A three-step approach was used to evaluate studies according to the inclusion criteria. First, all records were imported to Covidence (Veritas Health Innovation, 2020) and duplicates removed. Then, title and abstract screening was conducted by four independent reviewers (CK, CP, AM and JMN) who subsequently reviewed full texts for eligibility. Conflicts were resolved by the two reviewers (CK and CP) discussing relevant articles and reaching consensus.

Data extraction and charting

Data charting was conducted by three reviewers (CK, CP and AM). For each included study, relevant basic information such as authorship, year of publication, geographic location of study, gender, and age range of participants, but also type of digital platform, target area/issue, level of support, and target population in terms of marginalisation were charted. Relating to the research question, data on the aims of the study, identified co-production processes for digital mental health supports, study design as well as recruitment and incentives, followed by key findings were extracted (see Supplementary File 3 for extraction template used). A combination of Excel and Covidence management software was used to collate the charted data and manage the screening process.

Quality assessment

As this scoping review intends to provide an overview of the existing literature and not critically appraise the included articles, the risk of bias was not assessed. However, the authors have included a discussion of any limitations found in the included body of evidence.

Collating, summarizing, and reporting results

A total of 2341 records were identified across the twelve databases searched and their references were imported into Covidence for initial title and abstract screening. After removing duplicates, the titles and abstracts of 1243 studies were screened, and 1170 studies were subsequently

excluded as not meeting the inclusion criteria. A total of 73 studies were then assessed for eligibility via full-text screening, resulting in 21 studies that met the inclusion criteria for this scoping review (Figure 1 contains a PRISMA flow chart summarising the search and screening process). Full details on the included studies are documented in Table 1 and 2.

Table 1 presents the characteristics of included studies, which are grouped by country. Table 2 presents the same studies as Table 1 but groups studies according to the co-production process/es used.

Results

Study characteristics

Based on the review process, twenty-one studies focused on aspects of co-production of digital youth mental health supports with marginalised young people. Nine studies were conducted in the USA (Bhattacharya, 2020; Cai et al., 2023; Craig Rushing et al., 2021; Delmonaco et al., 2022; Giovanelli et al., 2023; Lopez & Eikey, 2022; Martinez et al., 2023; Porche et al., 2022; Smith et al., 2023), two in Australia (Cheng et al., 2021; Stoyanov et al., 2021), two in the UK (Bennett et al., 2022; Lucassen et al., 2022), one in Canada

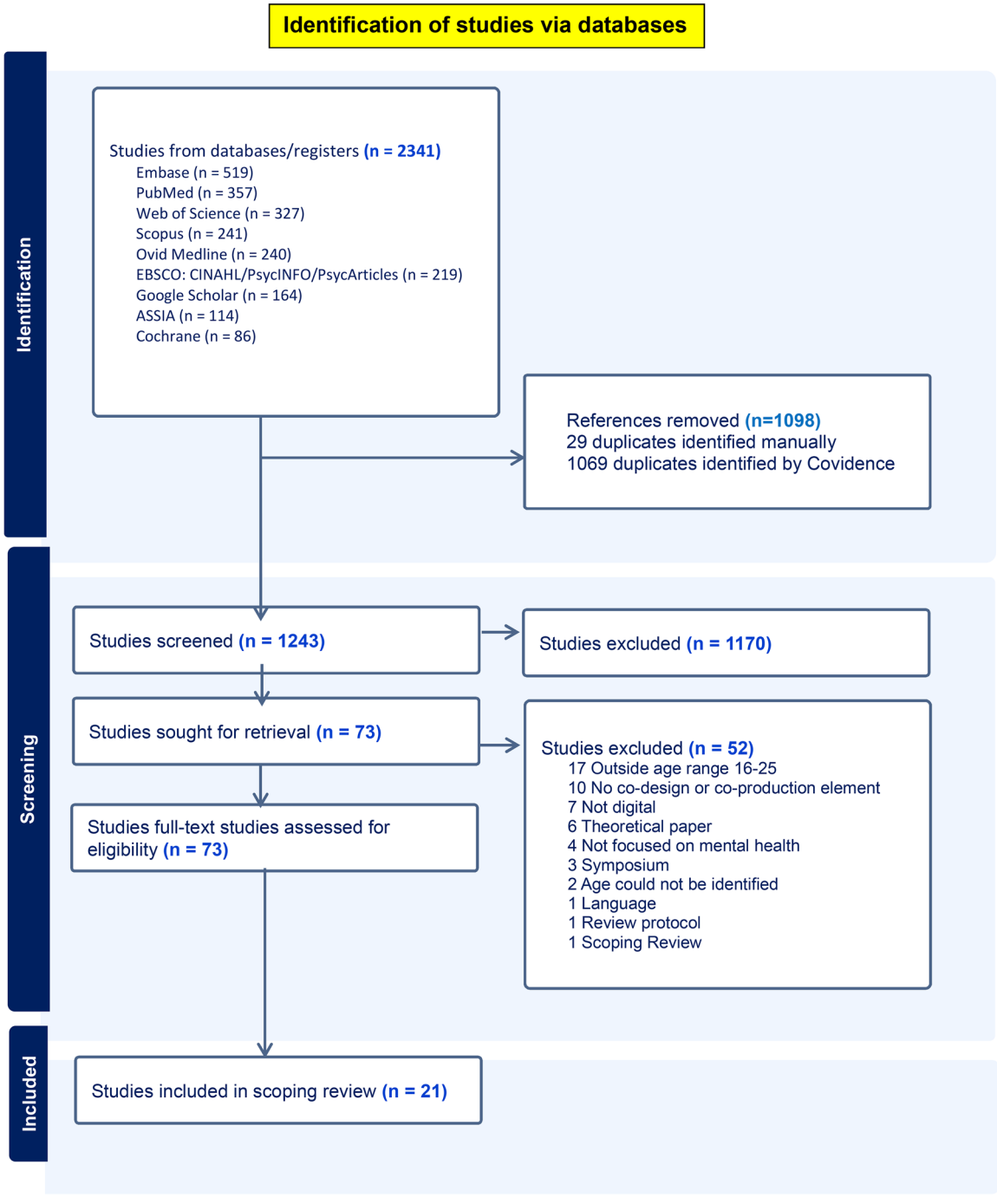

Figure 1. PRISMA diagram.

Table 1. Study characteristics.

Study and Country	Total *N*	Gender	Age range	Type of digital platform	Target area	Target issue	Level of support	Target population
Craig Rushing et al. 2021 USA	1030	Phase 1 Males: 14 (100%). Phase 2 Males: 16 (100%). Phase 3 Gender breakdown not provided	15–24	Text messaging (Emphasis is on text message delivery of a pre-defined prevention programme)	Targeted intervention	Mental health and behaviour change	Digital only	Indigenous
Lopez and Eikey, 2022 USA	79	Survey Males: 19 (25%) Females: 54 (72%) Other 1 (3%). Interview gender breakdown not provided	18–27	Prototype app and website	Promotion/ primary prevention	Mental wellbeing	Digital only	Ethnic minorities; immigrants
Delmonaco et al., 2022 USA	11	All participants identified as LGBTQ+	16–24	Website	Promotion/ primary prevention	General health and wellbeing	Digital only	LGBTQ+
Martinez et al., 2023 USA	12	Male: 4 (33.3%) Female: 8 (66.7%)	Mean (SD) 17.4	Communication Platform (Emphasis on online delivery of a pre-defined prevention programme)	Promotion/ primary prevention	Immigration-related trauma and stress	Human support with digital component	Immigrants
Cai et al., 2023 USA	12	Nonbinary: 4 (33.3%); Female:3 (25%); Genderqueer: 1 (8.4%); Trans males:4 (33.3%)	17–24	Online (video conferencing, sharing photos and creating a zine using Canva)	Promotion/ primary prevention	Wellbeing	Human support with digital component	LGBTQ+; ethnic minority
Bhattacharya 2021 USA	40	Study 1 Males: 3 (13%) Females:19 (83%); Other 1 (4%) Study 2 Males 8 (100%) Study 3 Males:4 (44.4%) Females:4 (44.4%) Other 1 (11.2%)	13–19	App	Targeted intervention	Stress and depression	Human support with digital component	Youth including LGBTQ+; ethnic minority; mild-to moderate symptoms of stress and depression
Smith et al., 2023 USA	10	No gender breakdown provided	14–19	Online platforms	Promotion/ primary prevention	Negative attitudes like stigma (i.e. mental health, internalized homophobia, transphobia), social support, knowledge, attitudes influencing therapy seeking, and preferences for intervention components and delivery modalities	Human support with digital component	LGBTQ+ or sexual and gender minority youth
Porche et al., 2022 USA	n/a	n/a	n/a	General digital mental health technology	Promotion/ primary prevention	Mental wellbeing	Human support with digital component	Marginalized/minority youth including Indigenous, ethnic minority and also those pushed to the margins by socioeconomic and other inequities that limit roles in decision making and creating resources for one's community
Giovanelli et al., 2023 USA	14	Males: 2 (14%) Females:12 (86%) Transgender 2 (14%)	15–18	App	Targeted intervention	Depression and anxiety	Human support with digital component	Youth including LGBTQ+; ethnic minority; rural; low income

(*Continued*)

Table 1. Continued.

Study and Country	Total *N*	Gender	Age range	Type of digital platform	Target area	Target issue	Level of support	Target population
Stoyanov et al., 2021 Australia	25	Males: 7 (28%) Females 18 (72%)	12–25	App	Promotion/ primary prevention	Mental wellbeing	Digital only	General youth including ethnic minority; unemployed
Cheng et al., 2021 Australia	75	Gender breakdown not provided; transgender and gender-neutral representation	12–25 (majority aged between 18–25)	Web-based	Promotion/ primary prevention	General mental health	Human support with digital component	General youth including LGBTQIA+; disability; ethnic minority; Indigenous
Bennett et al., 2022 UK	10	Males:2 (20%); Females or gender nonconforming: 8 (80%)	14–18	Online message board	Promotion/ primary prevention	Help-seeking	Human support with digital component	General youth including LGBTQ+
Lucassen et al., 2022 UK (Study Protocol)	Aim of 40	No gender breakdown provided	13–19	Web-based	Promotion/ primary prevention	Coping skills and resilience	Digital only	LGBTQ+ or sexual or Gender Minority Youth (SGMY)
Chaiton et al., 2023 Canada	33	Agender 2 (6%). Genderfluid 3 (9%). Genderqueer 4 (12%). Man 2 (6%). Nonbinary 8 (24%). Trans man 3 (9%). Trans woman 1 (3%). Two-spirit 1 (3%). Woman 9 (2%7)	16–29	Web-based	Promotion/ primary prevention	Mental health and substance abuse	Human support with digital component	LGBTQ2S+; ethnic minority; Indigenous; unemployed; disability
Thabrew et al., 2023 New Zealand	26	Males: 6 (23%). Females:17 (65%); Other:3 (12%)	16–25	App	Targeted intervention	Altering mood, suicidal ideation, and functioning	Human support with digital component	Youth including LGBTQ+; ethnic minority; Indigenous; receiving psychotherapy or medication treatment
Pretorius 2021 Ireland	1349	Study 2 Survey Males: 242 (18.5 %). Females: 1027 (78.5 %); Non-binary: 22 (2%); Transgender: 11 (1%) Study 3 Males: 15 (43%) Females:20 (57%) Study 4 Males: 6 (50%); Females: 6 (50%)	18–25	Technologies and online mental health resources	Promotion/ primary prevention	Help seeking	Human support with digital component	General youth including LGBTQ+; living in rural areas
Tachtler et al., 2021 Austria	24	Workshop 1 series Day 1: Males :4 Day 2: Males 3 Day 3: Males 5 Workshop 2 series Day 1: Males: 7 Day 2: Males:1 Day 3: Males 1	16–24	App	Promotion/ primary prevention	Mental wellbeing	Digital only	Unaccompanied migrants
Blattert et al., 2022 Germany and Switzerland	13	Males: 5 (38%) (3 AYA and 2 AYA with diagnosis/ suicidal ideation) Females:8 (62%) (6 AYA and 2 AYA with diagnosis/ suicidal ideation) *AYA: adolescents and young adults.	18–25	Web-based	Promotion/ primary prevention	Suicide prevention	Human support with digital component	Living in rural areas and those with mental health diagnosis

(*Continued*)

Table 1. Continued.

Study and Country	Total *N*	Gender	Age range	Type of digital platform	Target area	Target issue	Level of support	Target population
Götzl et al., 2022 Germany	674	Survey Males:346 (52%); Females: 318 (47.8%); Other: 2 (0.2 %) Focus groups Males: 4 (50%) Females: 4 (50%)	16–25	App	Promotion/ primary prevention	(1) Technology use and respective ownership, (2) use of technologies for health promotion and monitoring, (3) utilization of mHealth apps, and (4) attitudes towards the use of AI for personalized intervention components, (5) COVID-19 related cognitive preoccupation, worries, and anxiety, and (6) current use of, and attitudes toward, mHealth apps.	Human support with digital component	General youth including LGBTQ+; immigrants; ethnic minority
Malik et al., 2023 India	34	No gender breakdown provided for initial participants or Step 1. Step 2: Males: 1 (14.3%) Females:6 (85.7%)	Baseline Mean (SD) 16.4 Step 2 Mean (SD) 16.0	Remote intervention (smartphone)	Promotion/ primary prevention	Need for psychological support	Human support with digital component	Socio-economically deprived
Kola et al., 2021 Nigeria	260	Females; 260 (100%)	16–19	mHealth use for mental health care (smartphone)	Promotion/ primary prevention	Mental health care delivery	Digital only	Teenage/young mothers; low income

(Chaiton et al., 2023), one in New Zealand (Thabrew et al., 2023), one in Ireland (Pretorius, 2021), one in Austria (Tachtler et al., 2021), one in Germany (Götzl et al., 2022), one in Germany and Switzerland (Blattert et al., 2022), one in Nigeria (Kola et al., 2021), and one in India (Malik et al., 2023). Sample sizes varied widely between studies, from $N = 10$ to $N = 1349$ (Calculated mean and standard deviation – 188 (378 *SD*)). Seven studies included the representation of male, female and participants identifying as other genders, four studies included male and female participants; and three included only gender diverse participants (Cai et al., 2023; Chaiton et al., 2023; Delmonaco et al., 2022). Two studies included males only (Craig Rushing et al., 2021; Tachtler et al., 2021), while one study included females only (Kola et al., 2021). Six studies did not provide a gender breakdown, either for the whole or part of the study, while one study did not report gender representation of youth due to being a researchers' reflection on co-producing digital mental health supports (Porsce et al., 2022).

Type of digital platform, target area and target issue

Of the 21 studies reviewed, seven focused on apps (Bhattacharya, 2020; Giovanelli et al., 2023; Götzl et al., 2022; Lopez & Eikey, 2022; Stoyanov et al., 2021; Tachtler et al., 2021; Thabrew et al., 2023) and four on web based digital platforms for mental health supports (Blattert et al., 2022; Chaiton et al., 2023; Cheng et al., 2021; Lucassen et al., 2022). Other types included websites ($N = 2$), online platforms ($N = 2$), text messaging ($N = 1$), telehealth ($N = 1$), general digital mental health technology ($N = 1$), online message board ($N = 1$), technologies and online mental health resources ($N = 1$), remote intervention (smartphone) ($N = 1$) and mHealth use for mental health care (smartphone) ($N = 1$).

Seventeen of the 21 studies selected for review concentrated on mental health promotion and/or primary prevention, while four studies centred around targeted interventions (Bhattacharya, 2020; Craig Rushing et al., 2021; Giovanelli et al., 2023; Thabrew et al., 2023). The target issues addressed in the included studies pertained to; "general mental health" (N = 6), mental wellbeing ($N = 5$), help-seeking ($N = 3$), suicide prevention ($N = 2$), coping skills and resilience ($N = 1$), negative attitudes ($N = 1$), stress and depression ($N = 1$), depression and anxiety ($N = 1$), immigration-related trauma and stress ($N = 1$), substance misuse ($N = 1$) and behaviour change ($N = 1$).

Level of support and target population

In terms of the level of support provided, 14 studies included human support alongside the digital component, while 7 studies involved digital support only. Target population in terms of marginalised youth included LGBTQ+ or sexual and gender minorities ($N = 12$), ethnic minorities ($N = 10$), indigenous ($N = 5$), immigrants ($N = 4$), living in rural areas ($N = 3$), those with mental health diagnosis ($N = 3$), disability ($N = 3$), low income ($N = 3$), unemployed ($N = 3$), and teenage mothers ($n = 1$). While some studies focused on specific

Table 2. Detailed information on co-production processes.

Study	Aim of study	Co-production process	Study Design	Recruitment	Incentives	Key findings
Kola et al., 2021	Determine the prevalence of mobile phone use among perinatal adolescents and report patterns of use, as well as to assess the openness of young mothers to mobile health (mHealth) mental health interventions	Digital support needs assessment	Survey interviews with mothers lasting approximately 15 minutes included basic demographic details of respondents, pattern of mobile phone use, and willingness to engage in the use of mobile phones for general health and mental health-related programs. Interview surveys were read out to participants because of the possible low literacy rate of respondents	33 antenatal clinics in the 11 local government areas of Ibadan/Nigeria	Detergent soap that cost an equivalent of 1$	The challenges of pregnancy and childbirth increase the vulnerability of expectant mothers to common perinatal mental health problems such as anxiety and depression. Psychosocial treatments delivered in primary care settings in developing countries have shown promise in combatting perinatal depression. However, there are a host of barriers that may hamper young mothers' access to these interventions in clinical settings. Innovative treatment approaches are needed to increase adolescent mothers' access to mental health care for improved maternal and child health outcomes. Mobile phones have the potential to serve as important conduits to mental health care in Africa
Blattert et al., 2022	Explore the health needs regarding suicide prevention for adolescents and young adults in rural areas of Germany and Switzerland and to identify characteristics of suitable e-mental health interventions	Digital support needs assessment	Qualitative research Secondary analysis of archived data, which had been collected through formative participatory research: semi structured interviews with young people, peers, and experts to inform subsequent e-mental health intervention development	n/a	None	The results of this study highlight a need for suicide prevention services for young people in rural areas and indicate that young people often feel powerless and lost in the mental health care system and that pathways of help in critical situations are often unclear
Götzl et al., 2022	Investigate the subjective needs, attitudes, and preferences of key stakeholders towards an AI-informed mHealth app, including young people and experts on mHealth promotion and prevention in youth	Digital support needs assessment	Mixed methods Focus groups Survey	Focus group: Recommendations from steering committee members; contacting mentoring training program for high school students; personal networks using a snowball system. Survey: Internet users interested in participating in surveys or polls and registered members of the Norstatpanel by Norstat Deutschland GmbH.	Monetary (e.g. voucher)	Results highlight a pragmatic use of mHealth apps by young people, who show openness to AI but prefer personalization of all app processes, including the chance to determine the degree of personalization itself. Also, positive attitudes towards data sharing with an AI based mHealth app tended to decrease with the level of intimacy of the data requested
Lopez and Eikey, 2022	Aimed to better understand the mental health needs, barriers, and experiences of the Asian American student community and explored the co-design of a digital platform	Digital support needs assessment and design	Mixed methods: Secondary analysis of a needs assessment survey and preliminary human-centred design interviews, which included both interview questions and a co-design process	For survey: Social media, listservs; student organizations and wellness centres, flyer Interview: word of mouth, flyers, social media	Monetary (e.g. voucher)	Participants divulged the importance of culturally tailored mental health care and expressed the value of a provider who truly understands their experiences

(*Continued*)

Table 2. Continued.

Study	Aim of study	Co-production process	Study Design	Recruitment	Incentives	Key findings
Bennett et al., 2022	Explore 'real-world' data to inform understanding of help-seeking for CYP experiencing emotional abuse and neglect and define potential mediators (barriers and facilitators) and mechanisms of change associated with online peer support	Digital needs assessment and evaluation	Qualitative research Co-development and triangulation to apply different research methods (i.e. interpretative phenomenological, thematic and conversation analyses)	Members of the NeurOX Young People's Advisory Group (YPAG), aged 14–18 years were invited to apply to the	None	The novel methodological approach offers a meaningful way to explore 'real world' data with YCoR, for a population underrepresented in help-seeking research. Proposed relational mechanisms involve connection, compassion, and online communities. Further research coproduced with YCoR with diverse care experiences and characteristics is required to upscale the methodology and further validate and extend the findings
Pretorius 2021	Conduct an in-depth investigation of young people's needs from technologies that facilitate the online help-seeking process	Digital support needs assessment, design, and evaluation	Mixed methods Use of youth advisory board Cross-sectional survey, co-design workshops, and user study to evaluate design guidelines	Survey: online sources, such as youth mental health-related websites; targeted advertisements on social media User study: university	Monetary (e.g. voucher)	Recommendations for help-seeking tools and online mental health resources include provide opportunities for connectedness; provide credible and accessible information; provide personalisation, but respect autonomy; provide 'just-in-time' support options; and emphasize clear, professional design
Bhattacharya 2021	Understand how the design of remote technology can support teenagers to cope with stress and depression and empower their choice to act on healthy coping behaviours.	Digital support needs, design, implementation, and evaluation	Mixed methods Human centred design. 20-minute weekly activities in anonymous private online groups on Slack for 10 weeks Asynchronous Remote Communities (ARC), interviews via text chat, surveys, and co-design	Flyers around university campus, schools; reaching out in-person to teens at a BA depression management group at hospital; social media; emailing researchers' contact list of families who are willing to participate in research	Monetary (e.g. voucher)	Teens wanted support from technologies to support reflection, understand their mood, and navigate boundaries in sharing about mental health with adults/ peers. Both teens and clinician participants wanted asynchronous support as a supplement to in-person therapy and most teens preferred to preserve and enhance online peer support. Teens and clinicians also raised concerns about safety, privacy, and moderating the online group which need to be balanced with the potential benefits of learning coping strategies, increased access, and asynchronous human connection
Delmonaco et al., 2022	Understanding the online health-information practices of LGBTQ+ youth	Design	Qualitative research Virtual focus groups with semi-structured interviews and design sessions in which participants used digital drawing tools or their own materials (e.g. pen and paper) to sketch designs for their ideal LGBTQ+ health web resource	Recruitment emails and convenience sampling in coordination with community partner	None	Mental health, sexual health, and resources for navigating services were major areas in which participants identified disparities and difficulty accessing relevant resources. LGBTQ+ youth may find support via an LGBTQ+ community. Participants described the importance of understanding terminology related to gender, sexuality, and sexual health
Smith et al., 2023	Explore perspectives of a non-clinical sample of SGMY on the design of the prototype components for online mental health help-seeking interventions	Design	Qualitative research 60-minute interview over HIPAA-compliant online platform	Online/ social media	None	Content of digital interventions developed for SGMY mental health need to incorporate the multiplicative nature of stigma across different groups of SGMY. Interventions should include comprehensive educational resources, peer support especially through sharing peer experiences, and oversight by a professional moderator.
Tachtler et al., 2021	Investigate how to design technology driven interventions as a mental health resource in unaccompanied migrant youths social-ecological environment	Design	Qualitative research Co-design workshops series (W1 = 3 days; W2 = 3 days))	Local NGOs such as mentoring programs and initiatives for UMY	None	The findings highlight factors including personal experiences, technological infrastructure and social environment that need to be accounted for when designing technological mental health resources for unaccompanied migrant youth.

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Table 2. Continued.

Study	Aim of study	Co-production process	Study Design	Recruitment	Incentives	Key findings
Porche et al., 2022	Collaborative reflexivity through duoethnography methodology to reflect and report on experiences and lessons learned conducting co-designed projects with marginalized youth and families.	Design	Qualitative research Duoethnography with researchers that conducted co-design studies with young people	n/a	n/a	Reflective scientific journaling and dialogue by researchers and partners can evaluate processes and qualitatively track the dimension. of co-design, positionality, and integration of youth and family prioritized perspectives as end users and scientific partners. Inclusion of historically excluded communities is vital to ensuring treatments, including digital interventions, improve access to mental health. The integration of community partnered participatory research, human-centeredness and co-design offers an opportunity for success in this regard
Stoyanov et al., 2021	Co-design a youth-led information-, resource-, and support-focused mobile health intervention	Design	Qualitative research 3 in-person participatory design workshops (per group)-combined visual and linguistic data collection methods—photo elicitation and journey mapping	Facebook and researcher networks	Monetary (e.g. voucher)	The findings of this study gave insight into young people's understanding of well-being and recovery. While there is a vast number of health apps targeting a range of users and issues, many lack theoretical grounding, quality, reliability, and applicability to key stakeholders. This paper offers an insight into health app development through in-depth phenomenological research, co-design, adherence to app quality principles, and the involvement of diverse expertise
Craig Rushing et al. 2021	Findings from initial three phases of the design and development of a digital multimedia intervention for American Indian and Alaskan native young people aged 19–24	Design and testing	Mixed methods Phase 1—interviews with young males aged 19–24, phase 2—pilot testing with target audience, phase 3—RCT (pending)	Phase 1: Social media; Phase 2: e-newsletter	Monetary (e.g. voucher)	AI/ AN teens and young adults are a unique population who experience multiple health inequities, but here are limited resources available in AI/AN communities to support the iterative processes involved in this type of research
Cheng et al., 2021	Identify how best to improve a mental health and well-being health information technology for culturally diverse Australians in nonurban areas	Design and testing	Qualitative research Co-design/ participatory workshops where technology designs, ideas, and principles were evaluated by participants (sometimes iteratively)	Headspace offices	Monetary (e.g. voucher)	Participants emphasized the importance of having control over their user experience and their data Participants expressed that the technology should (1) be easy to use and understand, (2) provide meaningful guidance, and (3) be interoperable Participants also emphasized that any HIT should be easy to integrate into daily life.
Lucassen et al., 2022 (Study Protocol)	1. Co-design a media-rich evidence-informed web-based SGMY well-being prototype toolkit 2. Explore how the web-based toolkit can be used within public health systems in the United Kingdom by SGMY and potentially other relevant stakeholders 3. A preliminary evaluation of the toolkit	Design, implementation and evaluation	Qualitative research Interview and workshops	Via youth workers, including those based at the SGMY centers	None	SGMY are frequently problematized, whereas insufficient effort is directed at addressing the negative environments that mean SGMY are more likely to have mental health problems.
Martinez et al., 2023	Examine the impact that the transition to telehealth had on a school-based group prevention program for immigrant youth	Implementation	Qualitative research Semi-structured interviews with group leaders, and focus groups with youth program participants (Zoom)	Schools; High-School SBHCs (student support providers)	Monetary (e.g. voucher)	This study provides promising preliminary evidence in support of telehealth adaptation of prevention programs for immigrant youth, in particular as a method for fostering social connectedness in the context of isolation

(*Continued*)

Table 2. Continued.

Study	Aim of study	Co-production process	Study Design	Recruitment	Incentives	Key findings
Cai et al., 2023	Explore the methodological challenges and opportunities presented in adapting a youth participatory action research Photovoice project to an online format with LGBTQ+ youth of colour during the pandemic	Implementation	Community-based participatory action research Photovoice methodology (a participatory action research method in which participants share their experiences and tell stories through photography), conducted over 6-weeks on Zoom where participants shared and discussed photos and created a zine	Social media, community organizations and mental health clinics serving LGBTQ+ and people of colour; local High School and university; LGBTQ+ organizations and student services	Monetary (e.g. voucher)	Participants were comfortable with technology which helped overcome some of the challenges. Participants were actively engaged and formed meaningful connections with each other even through video conferencing. Participants stated they found the online groups to be safe spaces where they felt seen and heard by other group members. More extensive and explicit training for participants about how to protect their confidentiality in an online space may also be beneficial in future work.
Chaiton et al., 2023	Examine how web-based care modalities have affected access to care and quality of care for LGBTQ2S+ young people seeking mental health and substance use services	Implementation	Participatory design Three online group sessions to run program with activities	Through email invitation to the Public Health Agency of Canada 2SLGBTQI+Campaign on Commercial Tobacco Use and Its Culture cohort network and by referent recruitment through research team	None	Web-based care led to: better accessibility to services than that before the COVID-19 pandemic (physically easier to access especially for specific subpopulations that face barriers to in-person care, such as rural youths and disabled youths and reduced or waived fees for web-based care); greater access to service providers who were adequately trained to work with gender and sexually diverse youths
Giovanelli et al., 2023	Development and assessment of the feasibility and acceptability of Appa Health (Appa), an evidence-based mental health mentoring program for youth experiencing symptoms of depression and anxiety.	Implementation and evaluation	Mixed methods Mentor-mentee pairing. Quantitative survey combined with qualitative data assessing youth perspectives on the program, their mentors, and CBT content	Appa Health promotional videos posted on social media by the mental health content creators contracted	Monetary (e.g. voucher)	The Appa Health program was feasible with satisfactory rates of engagement with mentors via video chats. Participants also found the program acceptable. Participants were enthusiastic about Appa, citing the reduction of barriers to care, highly positive mentor experiences, and appreciation of both the content and presentation of the short-form videos. Youth scores on measures of symptoms of depression and generalized anxiety demonstrated promising trends over the course of the program with scores on the PHQ-8 and the GAD-7 reducing in severity over the course of the 12-week program.
Malik et al., 2023	Assessment of feasibility and acceptability of a stepped care mental health program delivered remotely by lay counsellors to adolescents during a period of lockdown	Evaluation	Qualitative research Post-intervention, qualitative semi-structured interviews with intervention participants	Student and teacher webinar	None	Limited uptake of the remote program in the targeted population, with enrolment mostly restricted to older adolescents. Given a choice of different access options for the remote counselling, participants uniformly chose voice-only calls over video-calls, due to privacy concerns, and a lack of internet-enabled devices
Thabrew et al., 2023	Evaluation of the acceptability and feasibility of 'Village,' a communication app co-designed with young people and their family and friends from New Zealand	Evaluation	Mixed methods Use of app for four weeks followed by semi-structured interview	Specialist child and adolescent mental health services and primary health services in Auckland	Monetary (e.g. voucher)	Young people who experienced preexisting difficulty communicating with available support in person or via social media and buddies (families or friends) with limited mental health knowledge found the app most useful. The feedback suggested that some improvements to onboarding and notifications would further increase the appeal of the app.

target groups only ($N=13$), others took a more general approach to the inclusion of participants and representation of marginalised groups ($N=8$).

Details on co-production processes

The main focus of this review, and thus of particular interest, was the co-production processes and related study designs employed. All of the studies reviewed discussed at least one, if not multiple, processes relating to the co-production of digital youth mental health supports with marginalised young people.

Co-production process and study design

Of the 21 studies included in this review, three conducted a digital support needs assessment (Blattert et al., 2022; Götzl et al., 2022; Kola et al., 2021), one focused on digital support needs assessment and design (Lopez & Eikey, 2022), one on digital needs assessment and evaluation (Bennett et al., 2022), one on digital support needs assessment, design, and evaluation (Pretorius, 2021), and one on digital support needs, design, implementation, and evaluation (Bhattacharya, 2020). The most common co-production process was design only, and this process was explored in five studies (Delmonaco et al., 2022; Porche et al., 2022; Smith et al., 2023; Stoyanov et al., 2021; Tachtler et al., 2021), while two focused on design and testing (Cheng et al., 2021; Craig Rushing et al. 2021) and one on design, implementation, and evaluation (Lucassen et al., 2022). A further three studies addressed implementation (Cai et al., 2023; Chaiton et al., 2023; Martinez et al., 2023), and one explored implementation and evaluation (Giovanelli et al., 2023), while the remaining two studies focused on evaluation only (Malik et al., 2023; Thabrew et al., 2023).

The study design utilized for involving marginalised young people in the various stages of co-producing digital mental health technologies consisted largely of qualitative methods ($N=13$) including community-based participatory action research (Cai et al., 2023) and participatory methods (Cheng et al., 2021), followed by a number of studies employing mixed methods ($N=7$). One study utilised quantitative methods only (Kola et al., 2021).

Qualitative methods were employed across the different stages of co-production from digital support needs assessment to evaluation. The study utilising quantitative methods only focused on digital support needs assessment.

Innovative approaches were used in only six of the 21 studies included in this review. The most common methods in qualitative and mixed methods studies included interviews ($N=9$) and co-design workshops ($N=9$). One study used human-centred design, which encompassed both interview questions and a two-step co-design process through card sorting, to categorize and rank mental health resources subsequently creating a resource (Lopez & Eikey, 2022). Another study utilised reflexive thematic analysis and content analysis of peer interactions from online message boards (Bennett et al., 2022).

Co-design workshops included focus groups ($N=3$) but also utilisation of tools such as Photovoice ($N=1$), photo elicitation and journey mapping ($N=1$), personas with three activity phases ($N=1$), discovery, evaluation, and prototype ($N=1$), duoethnography ($N=1$) and mentor-mentee pairing ($N=1$). In the Photovoice study, participants shared their experiences and told stories through photography followed by reflection and the creation of zine pages (Cai et al., 2023). In the photo elicitation and journey mapping workshops, participants selected images associated with the theme of the study, drew a journey map, and subsequently reflected on the drawing to inform the creation of a digital resource/prototype (Stoyanov et al., 2021). The co-design workshop that utilized personas comprised three distinct phases: (1) introducing the persona, (2) mapping the help-seeking journey, and (3) designing the online experience (Pretorius, 2021). In contrast, the discovery, evaluation, and prototype workshop included discussions on the topic, a review of platform components, and brainstorming sessions to generate new ideas and functionalities (Cheng et al., 2021). Lastly, duoethnography was also employed as a collaborative method in which multiple researchers compare their experiences to provide diverse understandings of a topic. After identifying research questions, followed by self-reflection and informal conversation, researchers actively engaged in written dialogue regarding co-production projects they are or were involved in. Through turn-taking, researchers responded to previous journal entries, adding new information and engaging in dialogue. Reflexive thematic analysis was conducted with nine entries from four researchers (Porsce et al., 2022).

Of the seven mixed methods studies, four used surveys to complement the qualitative data as well as usability testing ($N=3$). The reviewed study utilising quantitative methods only (Kola et al., 2021) employed a survey to capture basic demographic details of respondents, pattern of mobile phone use, and willingness to engage in the use of mobile phones for mental health-related programs. Questions were read out to participants because of the possible low literacy rate of respondents Two of the 21 studies reviewed tried to cover numerous co-production processes in a single engagement with young people, while only six studies were identified as using active youth participation when choosing appropriate research methods.

Recruitment and incentives

Recruitment strategies employed by the 21 studies reviewed varied widely and included social media ($N=7$), community partners ($N=4$), researcher networks ($N=4$), university ($N=3$), school ($N=3$), mental health services ($N=2$) and wellness centres ($N=2$). Strategies further included the use of flyers ($N=2$) and emails ($N=2$), antenatal clinics ($N=1$), recommendations from a steering committee ($N=1$), internet users that had signed up for surveys via national subscription ($N=1$), student organisation ($N=1$) and youth members on an advisory board ($N=1$). Recruitment also took place via the use of mental health websites ($N=1$), hospitals ($N=1$) and e-newsletter distribution ($N=1$). Two studies did not indicate their recruitment strategy as

one of these studies focused on researchers' reflections of co-producing digital mental health supports only.

Only five of the 21 studies reviewed reported on issues around youth engagement and attrition. One reported high dropout rates (Bhattacharya, 2020), one reported low uptake (Giovanelli et al., 2023), one reported on low response rate and high dropout (Malik et al., 2023), one reported on the need to reschedule focus groups a number of times due to low uptake and no shows (Martinez et al., 2023) and one reported on adjustment of recruitment strategy due to low enrolment rates into the study (Thabrew et al., 2023).

In order to compensate young people for their time and involvement in research, eleven studies used monetary incentives, one study used a physical incentive (detergent soap), and eight studies used no incentives (Bennett et al., 2022; Blattert et al., 2022; Chaiton et al., 2023; Delmonaco et al., 2022; Lucassen et al., 2022; Malik et al., 2023; Smith et al., 2023; Tachtler et al., 2021)

Again, as one study focused on researchers' reflections of co-producing digital mental health supports only, no incentives were recorded in this case (Porche et al., 2022).

Discussion

This scoping review sought to map the peer-reviewed and grey literature published from 2021 to 2023 on coproducing digital mental health interventions with marginalised young people to identify the most common processes for youth involvement.

Overall, this review reported on a mixture of qualitative and mixed methods studies from eleven countries with a wide range of sample sizes. The findings revealed that mental health promotion and prevention (81%) were the most common type of digital support co-produced with marginalised young people, with few targeted mental health interventions (19%). Most of the studies (67%) adopted and utilized human support alongside the digital platform rather than digital only (33%). More than half of the studies included representation from LGBTQ+ young people, and many also included ethnic minorities and immigrants in their study population, but few included other marginalised groups (such as young people with a disability, or youth living in rural areas). It is also important to note that a large number of studies (44%) did not compensate their participants for taking part in their research. Compensation/incentives demonstrate an acknowledgement of young people's time investment and an appreciation of the value for their contribution to the research process The practice of not paying research participants has important consequences in promoting diversity in research (Bierer et al., 2021). Some marginalised groups may be economically disenfranchised or vulnerable (Sannon & Forte, 2022), and therefore, their participation may be determined by compensation. Thus, the lack of incentives may have represented a barrier to the enrolment of individuals of lower socio-economic status and other marginalised groups, such as youth living in rural areas, limiting their inclusion and their representation in the studies. Details on the extent of this issue are not available in this review.

Methods used to involve marginalised young people in the co-production processes tended to be the more traditional types (i.e. surveys, interviews and focus groups) with limited youth engagement in the choice of methodologies. There is some evidence of the use of participatory and more innovative approaches such as photography and journey mapping. The latter arguably requires more active youth participation, which lies at the heart of co-production.

Passive participation limits young people's opportunities to influence the outcomes of the data collection process only. In contrast, active participation involves a complex set of negotiations between researchers and youth throughout different research stages (Ergler, 2015). Lower levels of youth engagement were observed in projects where research methods were primarily led by adult researchers. Participatory approaches in these cases typically included qualitative interviews, focus groups, and consultations (Rowland et al., 2024). Therefore, researchers should actively consider how to design and implement methods tailored to the perspectives and needs of young people from marginalised backgrounds (Larkins & Green, 2022). By offering a diverse range of methods and especially incorporating more creative and innovative research techniques, researchers can create an inclusive environment that amplifies various voices and perspectives (Raanaas et al., 2020). This approach can engage young people who may not always feel comfortable verbally expressing their experiences or perspectives (Maine Youth Action Network, 2020).

Co-production (referred to as the "Double Diamond" of the design and innovation process by the Design Council) involves 4 key steps: (1) "discover," where the problem is identified and user needs are established, (2) "define" which involves aligning user needs with the problem, (3) "develop" focuses on developing, testing and refining one or more potential solutions and the final phase (4) "deliver"—involves working on the final solution and preparing it for launch (Design Council, 2019). Methodologies such as usability testing and pilot testing may be employed during the "develop" phase with initial prototypes, before the final evaluation of the final solution takes place, e.g. in a randomised controlled trial.

Co-production processes in this review varied, from assessing needs to implementation and evaluation, however, with the exception of one study, which sought to include young people in design, implementation, and evaluation during a single engagement session, most studies typically involved young people in only one of the co-production phases.

Youth-focused co-production should involve active collaboration throughout all processes. This approach is crucial for enhancing the acceptability, feasibility, and effectiveness of digital mental health interventions aimed at marginalised young people (Gonsalves et al., 2025). A dynamic and flexible approach to co-production is recommended (Thabrew et al., 2018). Practical strategies to increase active youth involvement include engaging young people prior to the start of a project (Prebeg et al., 2023). To mitigate potential power imbalances, it is important to have transparent discussions about what is feasible given the project's scope and resource limitations (Mackworth-Young et al., 2022). This

should also involve establishing collaborative activities where young people have the final "sign-off" on decisions (Hodson et al., 2019) and allowing for the flexibility to change youth roles as needed within a project. Youth contributions should be recognized in various capacities, and their roles should be adapted when necessary (Prebeg et al., 2023).

Out of the 21 studies included in this review, only six were identified as aligning most closely with a true co-production approach by using active youth participation at some point in the study design (Bennett et al., 2022; Chaiton et al., 2023; Cheng et al., 2021; Delmonaco et al., 2022; Giovanelli et al., 2023; Pretorius, 2021).

Some of the findings from this scoping review resonate with the results of a previously published systematic review on co-production processes of digital mental health interventions with stakeholders of all ages and backgrounds (Brotherdale et al., 2024). The systematic review included 26 studies and found that the majority of studies (79%) included stakeholders during the discovery phase only and less than half of the studies ($n = 9$) involved stakeholders in all co-production aspects, i.e. discovery, design, development, and testing. Brotherdale and colleagues also found that traditional methodologies were used across the majority of studies and more innovative methods such as "thinking aloud" or cognitive walk-throughs were used in only a third of studies (Brotherdale et al., 2024).

This review suggests that young people are typically involved in only one of the co-production processes with design identified as most common. However, it is recommended that future work should focus on actively involving young people in all co-production stages of digital mental health technologies, including the decision-making process when choosing appropriate methodologies.

Strengths and limitations

This review maps the evidence of co-production processes for digital mental health supports with marginalised young people from 2021 to 2023 to capture the most current literature on the use of co-production related methods and the dynamic nature of this topic. A comprehensive search strategy was employed to search numerous electronic databases and grey literature sources. The strengths of the review lie in the inclusion of all co-production stages of digital mental health supports for young people, with a particular emphasis on marginalised young people who are often not actively involved in these processes.

Considering the study limitations, a more extensive grey literature search and expanding the 3-year literature timeframe could have yielded many more relevant studies. Only studies published in English were included, thereby excluding many potentially relevant studies published in other languages and from LMICs. A formal quality appraisal of included studies has not been conducted, and the review may be considered restrained by focusing on specific age groups and only few countries. Another potential limitation is that studies may include information on co-production with marginalised young people in the methods or results section of a manuscript, rather than in the title, abstract and keywords. Thus, these papers would not be easily identified in a scoping search with the terms used in the current review. Finally, there are potential issues with regards to the reporting of co-production processes in journal publications. Some studies presented here have or may employ more co-production processes in their larger projects but only report on a single process/current work package with limited additional information on specifics due to word count restrictions in journal publications and other related reasons.

Conclusion

To the best of our knowledge, this scoping review is the first to identify in what processes of co-production young people are typically involved in, especially with regard to those who are disadvantaged, vulnerable and/or marginalised.

The review indicates that, considering the level of involvement of marginalised groups in co-production studies, it is essential for young people to engage more actively in all co-production processes related to digital mental health technologies.

The co-production processes examined were varied, from needs assessment to evaluation and implementation, however, as previously noted by Stiles-Shields et al. (2023), studies typically involved young people in only one of these processes and more as passive rather than active participants. Further, the methods used to engage marginalised young people (aged 16–25) were primarily traditional in approach, such as surveys, interviews and focus groups, instead of engaging them in a more innovative and meaningful way when designing/developing, as well as implementing and evaluating, digital mental health technologies for young people's mental health.

Future studies should use a diverse range of participatory approaches to enhance engagement from young people and create an inclusive environment that values various voices and perspectives. Additionally, it is crucial to address the lack of inclusion of marginalised groups, such as young people with disabilities and youth living in rural areas, in future research efforts. Finally, future work should consider providing incentives to young people for taking part in research, which may also increase participation from those who are marginalised. This is important from the initial conceptualisation and should be considered when applying for study funding.

The findings serve as the foundation for the wider project, including a qualitative investigation of the issues related to digital mental health that young people across the island of Ireland face; identifying, with young people, the most useful digital mental health apps and interventions; validating, in partnership with young people, what digital mental health interventions are effective and utilising these findings to inform recommendations for policy and practice among health providers across the island of Ireland and beyond. The review adds to the body of knowledge in the field by not only outlining accomplishments to date but also by suggesting future directions for advancing the participation of

marginalised youth through the co-production of digital mental health supports. This will provide assurance of user input, accessibility, and ensuing advancement in the development and delivery of digital mental health tools

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Author contributions

CK, CP, MDM, GD, SO and MMB contributed to the development of this manuscript. CK conceptualised the research question, designed the study and prepared the first draft of the manuscript. MMB helped refine the research question and provided review expertise. All authors contributed to the refining of the study design as well as to the editing and revising of this scoping review. All authors have approved the final manuscript for submission.

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